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Checklists of Medicinal Plants used for Treating Snakebites and Socio-Economic Characteristics of Envenomation Herbalist in North-Eastern Nigeria

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Abstract

A survey was carried out in North-eastern Nigeria by sampling three states: Bauchi, Gombe and Borno. Questionnaire and interview were used to collect data from 63 snakebite envenomation herbalists through purposive and snow balling sampling methods. Seventy two medicinal plants were mentioned that are being used for treating snakebites. The five most used are Crinum asiaticum (Hausa name: Bakin gadali; English name: Spider lily), Annona senegalensis (Hausa name: Gwadon daji; English name: Sweetsop), Parkia biglobosa (Hausa name: Dorawa; English name: African locust beans), Aleurites moluccana (Hausa name: Kukuki; English name: Candle berry) and Cassia singueana (Hausa name: Rumfu English; name: Winter flowering senn). The envenomation herbalists' socio-economic characteristics indicated that 84.13% are males; 90.48% are married; 36.51 % are within 20 to 40 years of age; 50.79% are within 41 to 60 years while others are above 60 years; 16.92% are solely herbalists while others are engaged in different occupations which include farming, animal rearing, civil service and business; 23.81% have experience of 16 – 20 years in treating snakebites envenomation and

are dominants while 9.52% have 5 – 10 years with 17.46% having over 35 years of experience; 61.90% have their daily income above N3000. In terms of levels of education: 22.22% had informal education while others had formal education with dominantly 30.16% having basic education while1.59% had postgraduate qualification. From this survey, north-eastern zone of Nigeria has great plant and human resources for sustainably developing treatment of snakebites envenomation using medicinal plants and there is need for similar survey nationally.

Keywords: Treating Snakebites, Envenomation, Herbalist, Medicinal Plants, Socio-economic Characteristics.

Introduction

Background of the study

The World Health Organization (WHO) recently labelled snakebite a neglected tropical illness and a global health priority. Each year, snakebites are thought to cause 2.5 million envenomation, 138,000 fatalities, and over 500,000 cases of permanent disability globally (Benjamin *et al*., 2020). The continents of Asia and Sub-Saharan Africa are thought to have the highest rates of snakebites (Yirgu & Chippaux, 2019). Snakebite is an injury that occurs when you are bitten by a snake (Carmelita, 2022). Snakebite is a bite from a poisonous snake, such as a coral snake, cottonmouth, copperhead, rattlesnake, or rattler. These snake bites should be treated as medical emergencies (Melisa, 2021).

In many tropical and subtropical nations, snakebite is a neglected public health problem. Each year, there are roughly 5.4 million snakebites, resulting in 1.8 to 2.7 million cases of envenoming (poisoning from snakebite). Every year, there are between 81,410 and 137,880 fatalities, as well as around three times as many amputations and other forms of lifelong disability (WHO, 2021)

Owing to their safety, efficacy, cultural preferences, affordability, abundance, and availability, plants have been used to treat medical issues since antiquity and are becoming more relevant in the current period (Eshete & Molla, 2021). Snakebites are still a severe issue in Nigeria, especially in rural regions where access to quick, efficient treatment is scarce (Nodza et al., 2020).

Problem statements/Justification

In rural West Africa, snakebites are common and have a death rate of 11-17%. Narrowing it down to the study area, no fewer than 10 persons in a town

in Northeast, Nigeria, experienced snakebites everyday. While some of the victims received home remedies, others sought medical care, which is typically not easily available. According to Tribune national daily of January 30th, 2023, Bauchi State recorded 7 snakebites deaths in 2022, while an undisclosed number of persons received treatment and recovered. (Tribune, 2023). The casualties were mostly from the Duguri District of Alkaleri LGA of Bauchi State, which is known for having a high rate of snakebites due to the deep forests in the surrounding area. The famous Yankari game reserve is situated around the area.

Aim and objectives of the study

The aim of the study is to assess the ethnobotanical exploration of medicinal plants employed in managing snake bites envenomation in North Eastern Nigeria. The specific objectives are:

i. To conduct an ethnobotanical survey of plants used as remedy for snakebites in the study area.
ii. To evaluate the socio-economic characteristics of the envenomation herbalists in North Eastern Nigeria.

LITERATURE REVIEW

History of Herbal Medicine

Even before recorded history, people employed plants for medical purposes. As early as 3,000 BC, descriptions of plant medicines can be found in Chinese and Egyptian papyrus literature. Ayurveda and Traditional Chinese Medicine are two examples of traditional medical systems that utilise herbal remedies. Indigenous societies (such as African and Native American) also used plants in their healing rituals. Researchers discovered that people around the world frequently used the same or related plants for the same functions. When chemical analysis first became possible in the early 19th century, scientists started to extract and alter the active components from plants. Subsequently, chemists started creating their own versions of plant chemicals, and eventually, medication use replaced the use of herbal treatments. The majority of pharmaceutical medications come from plants, about one-fourth of them. According to a recent estimate by the World Health Organization, 80% of people worldwide depend to some extent on herbal remedies for their basic medical needs. Over 70% of German doctors prescribe plant-based medications, which number between 600 and 700 and are available in Germany. Herbal medicine use has increased over the past 20 years in the United States as a result of public discontent with the cost of prescription drugs and a desire to revert back to natural or organic treatments (Mount Sinai, 2023).

Throughout the majority of the world, plants are reliable sources of effective disease treatment. Herbal preparations are a key component of trado-medicine. Therefore, the World Health Organization (WHO) recognised this practise in its policy document in 1977 and upheld that "a medicinal plant" is a plant that contains substances in one or more of its organs that are useful for medicinal purposes or which are precursors for the production of useful drugs. A plant is considered medicinal if its organs contain components that can be utilised to make medications or if its active ingredients can be used to treat illness. Throughout antiquity, people have used plants to treat medical issues, and this practise is now becoming more popular because of its security, potency, cultural acceptability, affordability, abundance, and accessibility. For the treatment of erectile dysfunction, malnutrition, sickle cell anaemia, hernia, venereal diseases (syphilis, HIV, and gonorrhoea), postpartum haemorrhage, snakebites, cancer menorhagia, threatened abortion, skin disease, jaundice, and cough, more than 230 species of angiosperms from 168 genera and 69 families are used in Uganda (Omara *et al.*, 2020). They also said that most households they had come across had the ability to treat or prevent snakebites in other nations.

Herbal Plants

Herbal plants are frequently employed because they are affordable, accessible, and effective (WHO, 2010). African traditional medicine includes and is occasionally synonymous with herbal medicine. It is the oldest and remains the most popular medical system in use today. It is prevalent throughout all cultures and is employed in all societies. The World Health Organization (WHO, 2021) defines herbal medicines as herbs, herbal materials, herbal preparations, and finished herbal products that contain whole plants, parts of plants, or other plant materials, including leaves, bark, berries, flowers, and roots, and/or their extracts as active ingredients intended for human therapeutic use or for other benefits in humans and occasionally animals (Ezekwesili Ofili & Okaka, 2019).

The use of herbs to cure various illnesses is the specialty of the traditional healer known as the herbalist in the distinctive and well-known field of herbal medicine. They play a particularly noteworthy role because they have a full understanding of the medicinal characteristics of local plants and the pharmaceutical processes required to transform those plants into medications, including selection, compounding, dose, eflicacy, and toxicity. The usage of herbal remedies seems to be widespread across all cultures. Yet, different regions may have different plants used for the same ailments and different methods of therapy (Nodza *et al.*, 2020).

The term "medicinal plants" refers to any plant, including those used for food and fibre, that has one or more organs or sections that can be used therapeutically or, in more recent usage, whose contents can be employed as building blocks for the production of pharmaceuticals. For instance, certain herbs have been employed in conventional medicine for a long time without scientific evidence to support their efficacy.

These plants, whole or in part, are referred to as crude pharmaceuticals of natural or biological origin in this situation because they have medical characteristics. They can also be divided into "organised drugs" and "unorganised drugs," depending on whether they are derived from plant parts with cellular structures like leaves, bark, roots, etc. or non-cellular plant conmponents like gums, balsams, gels, oils, and exudates. In contrast to contemporary allopathic care, herbal medicine is widely accessible and accessible to all. Due to the widespread awareness of common medicinal herbs, particularly in rural regions, there is less need for traditional healers' consultations, save for the treatment of chronic ailments. Even in cases where traditional healers consult, there is a lack of agreement among them regarding the methods for making herbal remedies and the proper dosage. WHO estimates that at least 80% of Africans still get their medical care from plants, nonetheless. Herbal medicine has gained popularity in Nigeria and throughout West Africa, with some benefits being low cost, accessibility, acceptability, and what appears to be low toxicity (Ezekwesili-Ofili *et al.,* 2019).

Detail of plant parts used in herbal medicines is as follows:

1. Roots-i.e., the fleshy or woody roots of many African plant species are medicinal. Most of the active ingredients are usually sequestered in the root bark rather than the woody inner part.
2. Bulbs-A bulb is an underground structure made up of numerous leaves of fleshy scales, e.g., *Allium sativa* (garlic) and *Allium cepa* (onions).
3. Rhizomes—Woody or fleshy underground stem that grows horizontally and brings out their leaves above the ground, e.g., *Zingiber oficinale* (ginger). which is used for respiratory problems; *Imperata cylindrica* (spear grass) for potency in men and *Curcuma longa* (turmeric), an antioxidant, anti-inflammatory, and anticancer drug.
4. Tubers—Swollen fleshy underground struct structures which form from stems/roots, e.g., potatoes and yams such as *Dioscorea dumetorum* (*ona-(igbo)*) for diabetes and *Gloriosa superba* for cancer.
5. Bark—The outer protective layer of the tree stem or trunk. It contains highly concentrated phytochemicals with profound medicinal properties. A host of plants have barks of high medicinal value.

6. Leaves, stems, and flowers of many plants are also medicinal.
7. Fruits and seeds also contain highly active phytochemicals and essential oils.
8. Gums—Exudates, and nectars, which are secreted by plants to deter insects andgrazing animals and to seal off wounds, are very useful in the pharmaceutical industries.

Herb sales in the form of fresh or dried plant parts are just as lucrative as sales of ready-made medications. Ofen, they are offered for sale together with instructions on how to best cook them in markets (Ezekwesili-Ofili et al., 2019). Oladimeji (2022) asserts that the use of medicinal herbs as supplemental medicine has therapeutic advantages. Active components in herbal medicine come from organic plants. Even before the development of traditional medicine, they have been used for a very long time.

Method of Preparation of Herbal Medicine

Herbal ingredients will be treated using processes including extraction, distillation, expression, fractionation, purification, concentration, or fermentation herbal medicines. Herbal powders, tinctures, extracts, essential oils, expressed juices, and processed exudates are some of these (European Medicines Agency, [EMA]), 2023). Depending on the location and culture, many methods may be used to prepare herbal medications. Both fresh and dried plant materials are acceptable. With practise, a certain approach is picked to boost effectiveness and lower toxicity. Broadly speaking, many preparation techniques include:

a. Extraction—On a weight-by-volume basis, the solvent is used to prepare this. The solvent may occasionally evaporate into a mushy substance.
b. To make infusions, the raw medication is briefly macerated in either cold or hot water. To avoid deterioration, a preservative like honey may be used.
c. Woody bits are boiled for a predetermined amount of time, then strained to create decoctions. To help with extraction and as a preservative, potash may be used.
d. Tinctures are concentrated alcoholic infusions that can be diluted before being administered.
e. Ashing—The dried pieces are burned to ash, sieved, and then added to food or water.
f. Other—Other varieties include lotions, which are liquid preparations meant for skin application, and liniments for external applications in liquid, semi- liquid, or greasy forms containing the active ingredients. Poultices are made from freshly macerated plant parts that contain the plant's juice and are applied to the skin. Powdered dry plant material is absorbed through the nose as snuff. Plant charcoal is produced when dried plants are burned. Gruels are grain-based cereals or porridges that are then mixed with a dried, powdered plant material or its ash before being consumed. Often mixtures made from multiple plants are developed to maximise the synergistic or potentia effects of the composite plants.

METHODOLOGY

Study Area

The area of the study was North-East, Nigeria. One of Nigeria's six geopolitical zones, the North-East represents both the geographical and political heartland of the nation. The six states that make up this region are Adamawa, Bauchi, Borno, Gombe, Taraba, and Yobe. With roughly a third of Nigeria's total size, the North-East is the country's largest geopolitical region. About 12% of the nation's population, or around 26 million people, live in the region. The region's two most populated cities are Maiduguri and Bauchi. North eastern Nigeria shares land borders with Cameroon, Chad, and Niger. The states' residents' occupations are primarily in agriculture and animal husbandry. Their food crops include cassava, yam, guinea corn, maize, millet, and rice, while their cash crops are typically cotton and groundnut (Stoddard *et al.*, 2020).

Data Collection

Questionnaire and interview were the fact finding techniques used in this research. And purposive and snowballing sample techniques were adopted for this research. Therefore, three of the states in North-eastern zone Nigeria (Bauchi, Gombe and Borno) were surveyed and data were obtained.

Data Analysis

The data collected were analysed using descriptive statistics such as frequency, percentage and ranking.

RESULTS AND DISCUSSIONS

Results

Out of the 72 plants (Table1) which the herbalists (respondents) revealed to be using in treating snakebites *Crinum asiaticum* was most mentioned in all the locations where the survey was conducted, hence may be commonly available and very effective in treatment of snakebite envenomation. The plants comprise grasses, shrubs and trees; different parts are used (roots, stems, stem barks and leaves).

Table 1: Medicinal Plants used for treating Snakebites in North-eastern Nigeria

S/No.	Hausa Name	English/ Common Name	Scientific Name	Family Name	Bauchi	Gombe	Borno	Total	Rankin
1.	Bakin gadali	Spider lily	*Crinum asiaticum*	Amaryllidaceae	9	6	5	20	1st
2.	Gwadon daji	Sweetsop	*Annona senegalensis*	Annonaceae	6	5	1	12	2nd
3.	Dorawa	African locust beans	*Parkia biglobosa*	Fabaceae	2	1	3	6	3rd
4.	Kukuki	Candle berry	*Aleurites moluccana*	Euphorbiaceae	1	2	3	6	3rd

5.	Rumfu	Winter flowering senn	*Cassia singueana*	Fabaceae	2	-	2	5	5th
6.	Kargo	Monkey bread	*Pilosigna thonningii*	Fabaceae	2	-	2	4	6th
7.	Kuka	Baobab	*Adansonia digitate*	Malvaceae	1	3	-	4	6th
8.	Ararrabi	Frankincense tree	*Boswellia dalzielii*	Burseraceae	1	3	-	4	6th
9.	Doman dutsi	Calabash tree	*Crescentia cyete*	Bignoniaceae	3	-	-	3	9th
10.	Bini da zugu	Barbadose nut	*Jatropha curcus*	Euphorbiaceae	1	2	-	3	9th
11.	Maje	Balsam tree	*Daniellia oliveri*	Fabaceae	1	1	1	3	9th
12.	Yazawa	Cashew	*Anarcadium occidental*	Anacardiaceae	2	-	1	3	9th
13.	Sanya	Violet tree	*Securdaca longipedunculata*	Polygalaceae	-	3	-	3	9th
14.	Farun biri	Lan	*Lannea schimperi*	Anacardiacea	-	-	3	3	9th
15.	Namijin goro	Bitter kola	*Garcinia kola*	Clusiaceae	1	1	-	2	15th
16.	Mangwaro	Mango	*Magnifera indica*	Anacardiaceae	2	-	-	2	15th
17.	Hankufa	Sleepy morning	*Waltheria indica*	Malvaceae	1	-	-	1	27th
18.	Marke	African bitch	*Anogeissus leiocarpus*	Combrtaceae	1	-	1	2	15th
19.	Tokar gona	Blue pussyleaf	*Nelsonia canscenes*	Acanthaceae	1	-	1	2	15th
20.	Turgunuwa	Jute mallow	*Coechurs olitorious*	Tiliceae	1	-	1	2	15th
21.	Rai-daure	Coffee senna	*Cassia occendatalis*	Caesepinaceae	-	2	-	2	15th
22.	Shibrah	Pearl millet	*Pennisetum glaucum*	Poaceae	-	2	-	2	15th
23.	Tsamiya	Tamarind	*Tamarindus indica*	Fabaceae	-	1	1	2	15th
24.	Tumfafiya	Sodom apple	*Calotropis procera*	Asdepiadaceae	-	2	-	2	15th
25.	Albasa	Onion	*Allum cepa*	Amaryllidaceae	-	1	1	2	15th

26.	Gamji	Flake rubber tree	*Ficus platyphylla*	Moraceae	-	-	2	2	15th
27.	Kumbar shaho	White thorn	*Acacia polyacantha*	Fabaceae	1	-	-	1	27th
28.	Cikara				1	-	-	1	27th
29.	Aduruku	Tree of life	*Fiscus plathyphylla*	Moraceae	-	-	2	2	15th
30.	Alobera	Aloe vera	*Aloe barbadensis*	Liliceae	1	-	-	1	27th
31.	Baska	Aponge gourd	*Luffa aegytiaca*	Cucurbiceae	1	-	-	1	27th
32.	Gawo	Winther thorn	*Acacia albida*	Fabaceae	1	-	-	1	27th
33.	Farar kaya	Shittim wood	*Acacia seyal*	Fabaceae	1	-	-	1	27th
34.	Tafasa	Desert senna	*Senna covesi*	Fabaceae	1	-	-	1	27th
35.	Aduwa	Desert date	*Balanites aegypiaca*	Zygophyllacea	1	-	-	1	27th
36.	Sabara	Senegal tea plant	*Guiera senegalensis*	Combretaceae	1	-	-	1	27th
37.	Zamarke/ Maza tsaye	Kat sola	*Aeschynomene indica*	Fabaceae	1	-	-	1	27th
38.	Gadali	Harmattan lilly	*Crinum jagus*	Amaryllidaceae	1	-	-	1	27th
39.	Harshantin kiya	Protea	*Protea ellioti*	Proteaceae	1	-	-	1	27th
40.	Munjirya	Coral tree	*Erythria senegalensis*	Fabaceae	1	-	-	1	27th
41.	Bishiyar janyaro	Chicken blood	*Spatholobus suberectus*	Fabaceae	1	-	-	1	27th
42.	Hannu biyar	Barbasco	*Paullini apinata*	Sapindaceae	1	-	-	1	27th
43.	Kalan wuka	Wild flower	*Aspilia africana*	Asteraceae	1	-	-	1	27th
44.	Bakin bunu		*Indigofera pulchra*	Fabaceae	1	-	-	1	27th
45.	Icen baushe	Horse may	*Ulmus minor*	Ulmaceae	1	-	-	1	27th
46.	Gwanda	Paw-paw	*Carica papaya*	Caricaceae	1	-	-	1	27th

47.	Albiziya	Fry wood	*Albizia lebect*	Fabaceae	1	-	-	1	27th
48.	Dashi/iskici	African myrrh	*Commiphora Africana*	Burseraceae	1	-	-	1	27th
49.	Tafarnuwa	Garlic	*Allium sativum*	Amaryllidaceae	1	-	-	1	27th
50.	Farar Tauraruwa	Bush willow	*Combretum glutinosum*	Combretaceae	1	-	-	1	27th
51.	Karan masarachi	Resurrection plan/life	*Bryophyllum pinnatum*	Crassulaceae	-	1	-	1	27th
52.	Baure	Sycamore fig	*Ficus sycomurus*	Moraceae	-	1	-	1	27th
53.	Masara	Corn	*Zea mays*	Poaceae	-	1	-	1	27th
54.	Zogale	Drumstick	*Moringa oleifera*	Moringaceae	-	1	-	1	27th
55.	Faskara tuhi	Creeping thustle	*Cirsium arvenses*	Asteraceae	-	1	-	1	27th
56.	Taura	Tallow tree	*Deuterium microcarpum*	Fabaceae	-	1	-	1	27th
57.	Rogo	Cassava	*Manihot esculenta*	Euphorbiaceae	-	1	-	1	27th
58.	Sakayau	Sweet killer	*Anisopu mannii*	Apocynaceae	-	1	-	1	27th
59.	Morinda	Mulberry	*Morus alba*	Moraceae	-	1	-	1	27th
60.	Wake	Velvel beans	*Mucuna puriense*	Fabaceae	-	-	1	1	27th
61.	Tohon kaya	African ebony	*Diospros mespiliforms*	Ebenaceae	1	-	-	1	27th
62.	White lilly	White lilly	*Lilium candidum*	Liliaceae	-	-	1	1	27th
63.	Darbejiya	Neem	*Azadirachta indica*	Meliaceae	-	-	1	1	27th
64.	Gurjiya	Bambaranut	*Bombax costatum*	Bombaceae	-	-	1	1	27th
65.	Duhuwa	Flame thorn	*Acacia ataxacantha*	Fabaceae	-	-	1	1	

66.	Karan masarachi	Cathedral bells	*Bryophyllum pinnatum*	Crassulaceae	-	-	1	1	27th
67.	Nonon Kurciya	Ascending weedy	*Euphorbia hirta*	Euphorbiaceae	-	-	1	1	27th
68.	Katala	Walnuts/ Butternut	*Jugans cinerea*	Juglaridaceae	-	-	1	1	27th
69.	Takalmin Makka	Cactus plant		Cactaceae	-	-	1	1	27th
70.	Wada	Poison Devil tree	*Alstonia venenata*	Apocynaceae	-	-	1	1	27th
71.	Sansami	Pattern wood	*Alstonia boonel*	Apocynaceae	-	-	1	1	27th
72.	Kawo	African mahogany	*Afzelia africana*	Fabaceae	-	-	1	1	27th

Source: Field survey, 2024.

The respondents in the Study area focused on the location, their sex, marital status, age, occupation, experience, income per annum and their qualifications.

From Table 2, information on their sex revealed that 53 (84%) of the respondents were male while 10 (16%) were female. This implies that male is the dominant gender in the business and the result supported the findings of Ibrahim and Juma (2023). Information on their marital status reveals that 3 (5%) of the respondents were single, 57 (90%) of the respondents were married and 3 (5%) of the respondents were widow implying that majority of the herbalists are married.

The age dissemination of the respondents demonstrates that 9 (14%) are within the age of 20 - 30 years, 14 (22%) are in the range of 31 - 40 years, 18 (29%) are within the age range of 41 - 50 years, 14 (22%) are in the range of 51 - 60 years and 8 (3%) are above 60 years. However, none of the respondents have fallen in the range of less than 20 years. Based on the result of the questionnaire respondents within 41 - 50 years were dominants.

According to the data collected 32 or 24.62% were farmers, 30 or 23.07% were hunters, 27 or 20.77% were herdsmen, 22 or 16.92% were herbalists, 5 or 3.85% were civil servants, 9 or 6.92% were businessmen, 5 or 3.85% were other specified. However, none of the respondents was pastoralist. Based on the result shown 32 or 24.62% were farmers that dominated. In contrast, the lowest occupation was civil servants and other specified with 3.85% respectively.

In terms of Education, Table 2 shows that, 14 (22.22%) attended informal education, 11 (17.46%) with primary certificate, 19 (30.16) with BASIC/JSICE, 6 (9.52%) with

SSCE/SSICE, 8(12.79%) with certificate/ND/NCE, 4 (6.35%) completed HND/Bachelor Degree and 1 (1.59%) MSc. Based on Table 1, respondents with BASIC/JISCE dominated and followed by informal education with 14 (22.22%). However, on the other hand 1 (1.5⁹%) was the lowest. The information also revealed that 6 (9.5%) respondents have less than 5 years' experience, 4 (6.35%) have 11 -15 years' experience, 15 (23.81%) with 16 - 20 years' experience, 4 (6.35%) with 21 - 25 years' experience, 11 (17.46%) with 26 - 30 years' experience, 2 (3.17%) with 31 - 35 years' experience and 11 (17.46%) with more than 35 years' experience. This implies 15 (23.81%) Respondents have the highest working experience i.e. 16 - 20 years.

Based on the income per day of the respondents, table 1 shows that 2 (2.17%) respondents earned 100 - 200 per day, 1 (1.59%) earned 501 - 600, 5 (7.94%) earned 601 - 1000, 1001 - 2000 and 2001 - 3000 respectively. Also 39 (61.90%) of the respondents earned greater than 3000 per day. While none of the respondents earned 201 - 400 and 401 - 500 per day. The highest income per day dominated by 39 (61.99%) of respondents who earned more than 3000.

Table 2: Socio-economic Characteristics of Snakebite Envenomation Herbalists in North-eastern Nigeria

Parameters	Frequency	Percentage %
Sex		
Male	53	84.13
Female	10	15.87
Marital Status		
Single	03	4.76
Married	57	90.48
Divorced	-	-
Widowed	03	4.76
Age		
<20	-	-
20 – 30	09	14.29
31 – 40	14	22.22
41 – 50	18	28.57
51 – 60	14	22.22
>60	08	2.70
Occupation		
Farming	32	24.62
Hunting	30	23.07

Animal Rearing	27	20.77
Herbalist	22	16.92
Pastoralist	-	-
Civil servant	05	3.85
Business	09	6.92
Other specify	0.5	3.85
Experience		
<5	06	9.52
5 – 10	10	15.87
11 – 15	04	6.35
16 – 20	15	23.81
21 – 25	04	6.35
26 – 30	11	17.46
31 – 35	02	3.17
>35	11	17.46
Income per day		
100 – 200	02	2.17
201 – 400	-	-
401 – 500	-	-
501 – 600	01	1.59
601 – 1000	05	7.94
1001 – 2000	05	7.94
2001 – 3000	05	7.94
>3000	39	61.90
Educational Qualification		
Informal	14	22.22
Primary	11	17.46
Basic/JSICE	19	30.16.
SISCE/SSCE	06	09.52
Cert./ND/NCE	08	12.79
HND/Bachelor's Degree	04	6.35
Postgraduate	01	1.59

Source: Field survey, 2024.

Discussions

The result of this research is similar to other studies which reported the use of trees more in traditional medicines, with leaves widely used in most African countries like Nigeria, Uganda, Ethiopia and Mali (Ugbogu and Akinyemi, 2004; Tagola, 2005;

Muniappan and Savarimuthu, 2011; Shehu et al., 2017). Some of the medicinal plants were reported to be cited in treating different ailments such as asthma, stomach-ache, headache, diarrhea, whitlow, dysentery, gonorrhea and cough, among others. Ethnobotanical surveys of medicinal plants used in certain localities support tropical conservations of bioresources (Shehu et al., 2017). The traditional practitioners in this study stated that in most cases, snakebites were first treated locally with traditional medicine at home and transferred to the hospital only when there is no improvement or critical condition. It was reported earlier that initial local treatment of diseases is quite common among the African people (Isa et al., 2015). This could be part of the reason why there is diverse modes of preparations and routes of administration of these medicinal plants in the area and in most parts of Africa were traditional medicine is fast gaining grounds. An evidence for use of medicinal plants was reported in this study in which 25 plants were reported useful in snakebites in North-western Nigeria.

SUMMARY, CONCLUSION AND RECOMMENDATIONS

Summary

A survey was carried out in North-eastern Nigeria by sampling three states: Bauchi, Gombe and Borno. Questionnaire and interview were used to collect data from 63 snakebite envenomation herbalists through purposive and snow balling sampling methods. Seventy two medicinal plants were mentioned that are being used for treating snakebites. The five most used are Crinum asiaticum (Hausa name: Bakin gadali; English name: Spider lily), Annona senegalensis (Hausa name: Gwadon daji; English name: Sweetsop), Parkia biglobosa (Hausa name: Dorawa; English name: African locust beans), Aleurites moluccana (Hausa name: Kukuki; English name: Candle berry) and Cassia singueana (Hausa name: Rumfu English; name: Winter flowering senn). The envenomation herbalists' socio-economic characteristics indicated that 84.13% are males; 90.48% are married; 36.51 % are within 20 to 40 years of age; 50.79% are within 41 to 60 years while others are above 60 years; 16.92% are solely herbalists while others are engaged in different occupations which include farming, animal rearing, civil service and business; 23.81% have experience of 16 – 20 years in treating snakebites envenomation and are dominants while 9.52% have 5 – 10 years with 17.46% having over 35 years of experience; 61.90% have their daily income above N3000. In terms of levels of education: 22.22% had informal education while others had formal education with dominantly 30.16% having basic education while1.59% had postgraduate qualification. From this survey, north-eastern zone of Nigeria has great plant and human resources for sustainably developing treatment of

snakebites envenomation using medicinal plants and there is need for similar survey nationally.

Conclusion

Snakebite envenomation treatment using medicinal plants is very critical development that has to be sustained and further develop in our society; with this survey reveling 72 plants in north-eastern zone of Nigeria, it is a great indication that there is available resource and with the range of age (20 to over 60 years) and experience of over 35years among the envenomation herbalists as well as majority having formal education, undoubtedly there is human resource for sustainably developing treatment of snakebites envenomation using medicinal plants.

Recommendations

Based on the findings of the study, the following recommendations are made:

i. Traditional medicine healers/herbalists in the study areas are to firm an effective union/association in order to work effectively and cooperatively towards achieving their goals.
ii. Government of the states and federation should provide serious means of public orientations on the treatment against snake bites envonomation using biomedicine, because it is economically viable, socially acceptable and environmentally friendly.
iii. It is also recommended to help in passing down information on traditional medicine from generation to generation through documentation of facts that is made available to researchers worldwide.
iv. Similar research can be employed in the other regions of the nation.

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